



Australia: Power Generation Industry

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Summary

Following deregulation of Australia's electricity industry in the 1990's, there have been significant changes in the ownership and operations of the previously state owned utilities. The creation of a national market for electricity through the interconnection of the infrastructure has added another degree of complexity to what were mostly independent systems. Deregulation has also opened up all segments of the electricity supply and distribution industry to a range of new operators.

The key issues facing the industry are ensuring there is sufficient electricity in rapidly developing areas (particularly during hot weather demand spikes), replacing or refurbishing ageing assets, and the environmental impact of electricity generation. Aging infrastructure and economic growth in a number of Australia states are causing power shortages during peak load times. The Australian Bureau of Agricultural and Resource Economics (ABARE), has estimated that around USD \$35 billion of investment will be required over the 10 to 15 years.

Historically Australia's power industry has largely been based around its significant brown and black coal reserves. Aside from the Snowy Mountains Hydro Scheme, there has been little investment in renewable generating technologies. While Government funding schemes have been developed to support the costlier generation of renewable energy, these assistance measures can only support limited renewable energy projects. Increased public attention and lobbying may lead to increased government assistance through extensions to existing support schemes or the introduction of new schemes. In the interim, gas turbine generators are increasingly being developed using Australia's ample natural gas resources. Such plants are seen as a more environmentally friendly way to generate electricity than coal-fired generation,

This report presents an overview of the Australian electricity market, including generation, transmission and distribution. Included is an assessment of the competitiveness of US products and some discussion of potential opportunities for US companies that sell power generation products and / or services.

Market Demand

Generation of electricity in Australia since 1974 has increased more than 3.5 times from 59,000 GWh to the current level of over 216,000 GWh. Estimates of the installed value of generating, transmission and distribution assets suggest an investment value around USD \$75 billion. Current industry predictions forecast that Australia's demand for electricity will reach an estimated 280,000 GWh by 2020 and more than 330,000 GWh by 2030.

The above growth represents an average annual growth rate around 2% and an expected capital investment of USD \$35 billion. This growth and associated expenditure is expected to be significantly greater in some locations in response to the development of new population and industry centers.

In the early 1990s Australia's electricity industry was controlled by a group of vertically integrated government owned entities responsible for all activities from generation through to distribution and customer billing. Significant changes to almost all of these state-owned enterprises have included dismantling the vertical integration, and placing generation, transmission and distribution assets into a number of competing companies. The Australian Federal and State Governments have established a series of regulations to promote market activity including controlled access to the electricity grid for all parties.

In the states of South Australia and Victoria the generating and distribution assets are now in the hands of private companies. In other states, such as New South Wales and Queensland, the state government still owns the

majority of disaggregated generators and distributors. . The Queensland government appears to be moving towards privatizing more of its state owned corporations.

The State of Western Australia is beginning the process of restructuring its power sector by the split up of the vertically integrated Western Power Corporation into four government-owned corporations – thereby allowing increased access to the Western Australian market for other suppliers.

In the past 10 years the Australian electricity industry has established a national power market including the interconnection of the previously separate state grids (allowing inter-state trading of electricity). This system includes all Australian states except Western Australia (due to the geographic distance of its population centers from other states).

The majority (200,000 GWh) of Australia's electricity is generated via fossil fuel generators, with the renewable energy sector (principally hydro) accounting for 16,000GWh.

There are a number of federal and state-sponsored schemes to induce the introduction of renewable technologies to the Australian market. These schemes have contributed significantly to the growth of the local wind energy industry.

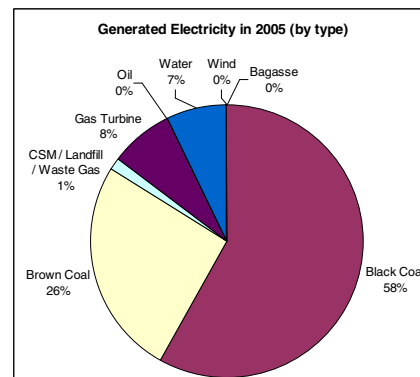
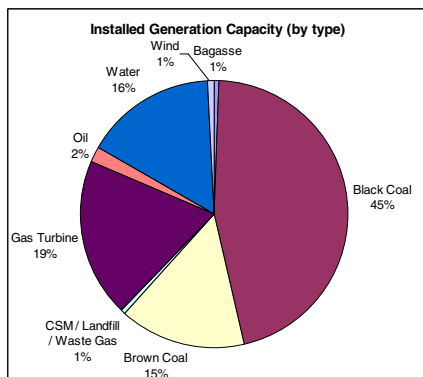
The Australian renewable energy industry has criticized these schemes as being insufficient to promote large future growth in renewable energy, and is pushing for increases to the present schemes as well as a carbon trading mechanism to drive growth in the sector.

Market Data

Australia's electricity pricing to consumers is relatively low, comparing favorably to other industrialized countries. Australia's average cost per kilowatt hour (kWh) is A\$0.10, compared to Japan (A\$0.284), Germany (A\$0.254), France (A\$0.195), UK (A\$0.177), and the U.S. (A\$0.145) Tariff Network of Experts UNIPDE, Jan 2003

This competitive edge is largely due to Australia's reliance on coal-fired generation. Local coal deposits are estimated to have reserves of around 700 years at present rates of consumption. Despite these relatively low average costs of generation, electricity spot pricing (30 minute intervals) can rise as high as USD \$ 7,800 per MWh during peak loads, 300 times the normal price. Such events occur several days each summer as a result of system capacity constraints and adverse weather conditions.

The breakdown of generating equipment by installed capacity and by generation volume is presented in the figures below. Whilst coal accounts for around 60% of installed capacity, 84% of electricity generated in Australia is via coal-fired power stations. Coal therefore represents the bulk of base load power.



Peaking power needs are mainly met by gas turbine power stations installed around Australia. Given the prevalence of natural gas, and absence of coal, in some of Australia's developing regions, we may see more gas

turbine base load power in the future. There is also an environmental push to establish more gas-fired generation, as it is perceived as cleaner than coal-fired generation.

Hydropower continues to be an important element of Australia's generation infrastructure, although restrictions on dam building have meant few hydro stations have been built in the last 30 years. Ongoing drought in many parts of Australia is further restricting the generation of hydropower.

The other renewable forms of electricity remain comparatively small by installed capacity and even smaller by electricity generated. However these are amongst the fastest growing segments of the generation industry. Table 1 below presents details on both the size and number of plants installed

Table 1 – Generating Plants by Fuel and Size

Generator fuel	>500MW	200 to 500MW	75 to 200 MW	10 to 75MW	<10MW
Bagasse				14	
Biomass				1	
Black Coal	16	2	3	3	
Black liquor				2	
Brown Coal	5	1	2		
Coal Seam Methane				3	
Landfill Gas				3	
Natural Gas Turbines	3	8	27	34	1
Oil		1	1	17	1
Waste Gas				5	
Water (hydro)	4	6	14	26	3
Wind farms			2	9	2

Notes (1) Individual generating plants can be made up of multiple generating units, e.g. Eraring 2640MW coal fired station (4 x 660MW units)

The Australian continent is comparable in size to the continental US. Its population of 21 million is approximately 1/15 of the United States'. These facts have implications for the location and type of electricity assets, and include a requirement to serve large areas with low population densities.

The following tables present a summary of the key statistics relating to the installed infrastructure as of June 2003. ESAA Year Book 2006

Table 2 -Transmission & Distribution Assets

	Overhead Wires ⁽¹⁾	Underground Cables ⁽¹⁾	Transformers ⁽²⁾
330kv + 500kv	6,392	29	165
132kv + 220kv + 275kv	25,644	410	1,054
66kv + 88kv + 110kv	18,312	184	2,047
22kv + 33kv + 44kv	124,052	5,922	191,684
11kv and below	114,426	13,841	333,028
Low Voltage	95,510	34,522	

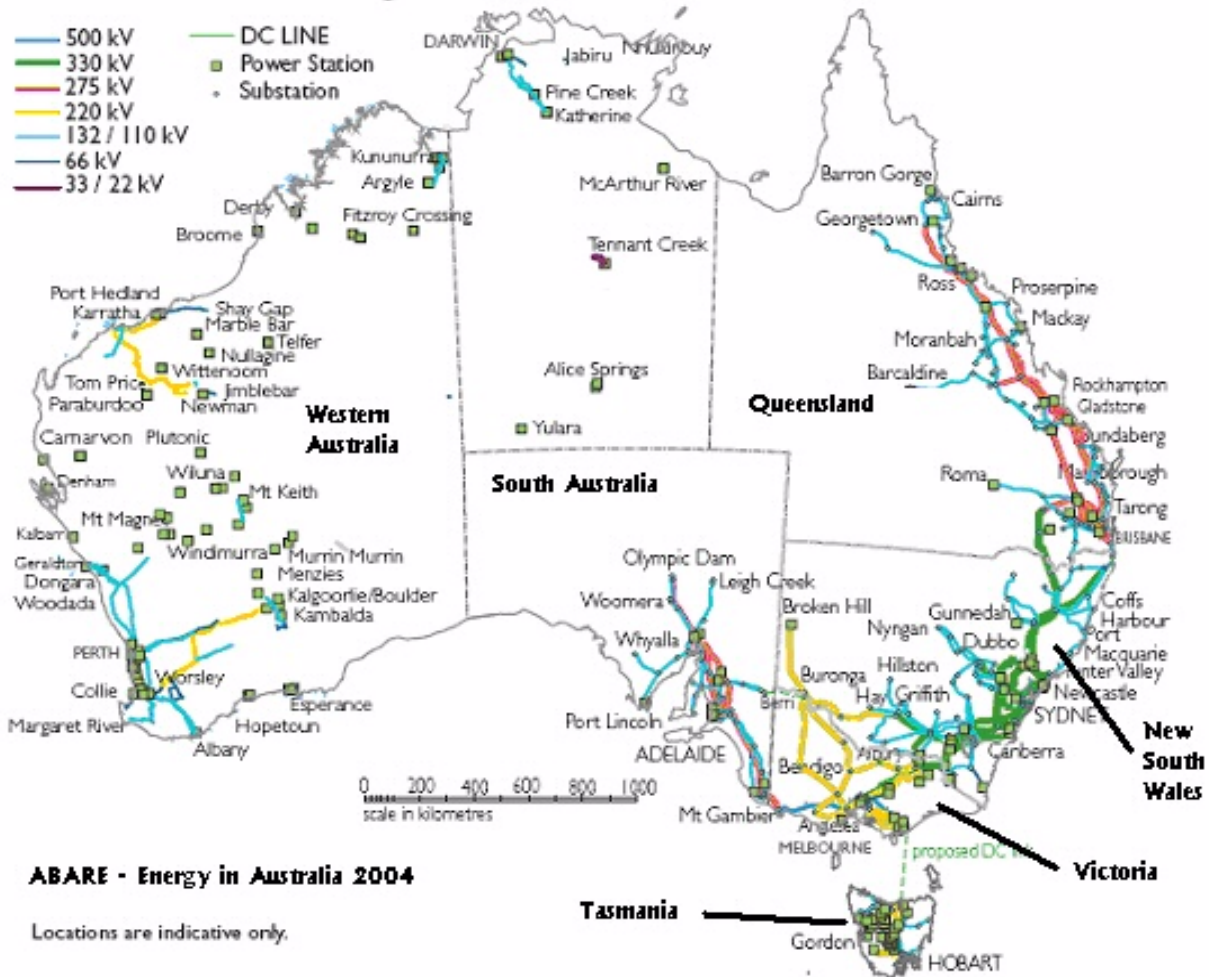
Notes (1) lengths are in miles of installed cable
(2) number of transformers installed

Table 3 -Distribution Poles

	Timber	Concrete	Metal
Number of poles	5,486,489	478,156	366,262

The figure below shows the locations of the major transmission lines across Australia. The interconnection between the states of Queensland, New South Wales, Victoria and South Australia are clearly marked, as is the newly completed cable crossing to Tasmania. The state of Western Australia remains unconnected to the national grid given its distant location from the other states.

Transmission lines and generators



Key Suppliers

US manufacturers of equipment for the power generation industry remain successful in Australia, occupying a top three spot in many of the industry segments, as illustrated in Table 4 below.

Many of the international suppliers to the Australian market are large companies including ABB, Alstom, Siemens and Mitsubishi. Each of these manufacturers has established subsidiaries in Australia for ten or more years. US products are generally well-regarded for their quality and reliability, but are often viewed as being considerably more expensive when compared with other manufacturers.

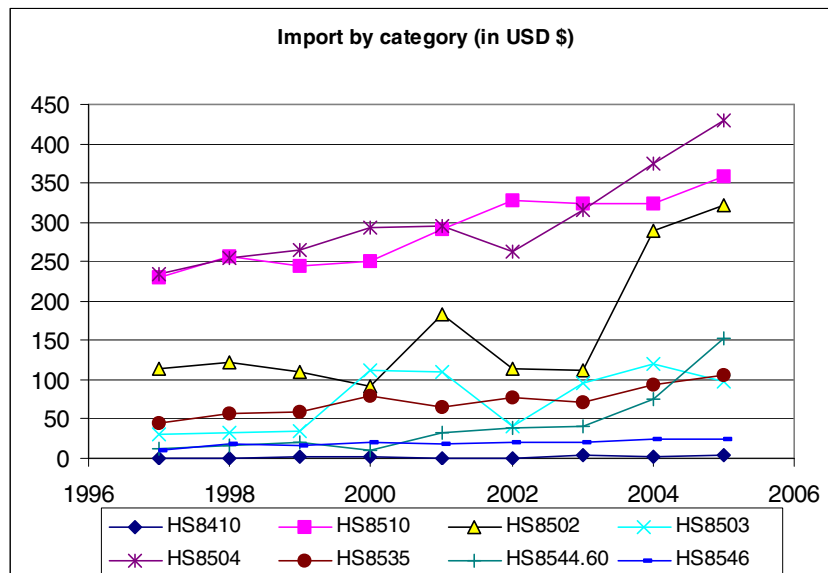
Over the past few years, Chinese producers have made inroads into a number of market segments, and have established a leadership position in the supply of imported transformer products. Manufacturers from the Asia

Pacific region are displacing many of the European countries previously supplying Australia. In addition to China, countries such as Indonesia, Japan, Malaysia, Singapore, South Korea, Taiwan and Thailand are supplying equipment to the local electricity market.

Table 4 - Electric Power Equipment Exports to Australia (amounts in USD \$ millions)

Country	Hydraulic Turbines	Electric Motors & Generators	Electric Generating Sets	Generator Parts	ADP Power Supply, Transformers	Switches, fuses, surge protection (>1000V)	Insulated Wire & Cables	Electrical Insulators
	HS 8410	HS 8501	HS 8502	HS 8503	HS 8504	HS 8535	HS 8544.60	HS 8546
Brazil								1.0
China	0.4	39.9			88.4		5.3	3.8
Denmark			64.9	27.7				
Finland	1.8			7.9				
France						6.7		
Germany	0.4	58.3	109.7		74.8	17.8		1.8
Indonesia							5.6	
Japan	0.6	22.2		5.7				6.2
Korea, South							2.8	
Malaysia							21.2	
New Zealand						16.2		1.8
No Country Details							109.0	
Singapore			23.3					
Sweden						12.2		
Taiwan		22.7			37.9			
Thailand					16.0			
United Kingdom			31.2	10.1				
United States	0.4	70.4	35.6	27.5	43.2	14.7		4.7
World	4.5	357.9	322.4	97.8	428.7	106.4	153.0	23.7
Top 5 countries % of total	79.6%	59.7%	82.1%	80.6%	60.7%	63.5%	94.0%	81.3%

The graph below illustrates the growth in imported products, with several categories growing significantly in the last few years. Increased demand for generating sets, transformers and insulated wire and cables in recent years, reflects the expansion of the Australian electricity supply network on the back of strong mining and construction activities.



While there is no legislative requirement regarding the amount of local content in electric power projects in Australia, there are local standards to which equipment supplied to Australia must comply.

A number of US companies have owned and operated electric power assets in Australia since deregulation of the industry allowed private ownership. Several of these companies have since left the market (Duke, Edison, TXU) suggesting the market is competitive even for larger firms.

The international nature of the industry extends to the supplier relationships. In addition to suppliers from the Asian countries mentioned above, German manufacturers are quite strong in the Australian market, but –again -- face increased competition from lower cost suppliers such as China.

Prospective Buyers

Major Projects

Australia has several schemes to assist sustainable energy projects including the Australian Government's Mandatory Renewable Energy Target (MRET) scheme (<http://www.greenhouse.gov.au/markets/mret/>), NSW Government's NGAC (http://www.greenhousegas.nsw.gov.au/overview/nsw_gacs.asp) and the Queensland Government 13% gas scheme (<http://www.energy.qld.gov.au/13percentgas.cfm>)

Under the MRET scheme renewable energy certificates (RECs) are issued for each MWh of renewable energy generation. By mid 2005 a total of around 9.2 million RECs had been created and redeemed out of the total anticipated 138.7 million credits to be provided by the time MRET ends in 2020.

RECs are bought by non-renewable generators who are required to purchase a certain number of RECs based upon the amount of non-renewable energy they produce. The price for RECs commenced around USD \$29 in March 2003, peaked at USD \$32 in August 2004, and in mid 2006 had fallen to USD \$18.

The Australian Government has decided not to increase the annual assistance provide under MRET beyond the 9,500 GWh / year by 2010. Consequently the NSW and Victorian state governments are proposing to introduce their own assistance schemes respectively called NRET and VRET.

Australia is not a signatory to the Kyoto Protocol and has decided to emphasize research and development of technological solutions to address the environmental problems produced by its fossil fuel generators. In seeking a technological solution, Australia is a founding member of the Asia Pacific Partnership on Clean Development and Climate (AP6), along with China, India, Japan, South Korea and the United States. There may be opportunities for US firms to partner with Australian firms under AP6.

Buyer Segments

The anticipated USD \$35 billion in spending to 2020 is likely to be spent on generation (33%), transmission infrastructure (18%) and distribution systems (49%).

Ongoing privatization of the market is likely to open up opportunity for third parties to become involved in the generation and distribution of electric power in Australia. There is still considerable expansion of the transmission and distribution networks as populations shift to newly developed areas and previously uninhabited areas are opened up for mining and other activities.

Replacement and maintenance of aged infrastructure is a significant concern, particularly in areas where systems improvements to meet increasing population numbers have been delayed. In some areas, the expected incremental growth exceeds the current supply of electricity. This is particularly the case in areas where electricity consumption will reflect an increase in home air conditioner use.

Many state governments are concerned that increases in generation and delivery capacity may not come soon enough. As a result, they have introduced programs to reduce the use of electricity (particularly air conditioners) to cut the peak loading on the electricity system.

As much of Australia's electricity is currently supplied by coal-fired power stations, there is increasing pressure to reduce the environmental impact of these generators. Environmental concerns are driving the search for cleaner generation methods and technological solutions to this issue would be well regarded.

The growth in gas turbines is expected to continue in the near future. Australia's large supplies of LNG and its reputation as a cleaner technology than coal will drive this growth.

Renewable energy projects continue to be hampered by their poor economics compared to the much lower costs of fossil fuel generation. The issues around inter-connection of these less stable generation methods into the electricity grid will also present obstacles. Community and business pressure appears to be gathering behind cleaner generation, which may prompt a change to Government policy on renewable generation.

Best Prospects

- Generator parts HS8503 – introduction of the US-Australia FTA has reduced duties by 15%
- Equipment used in the efficiency upgrading of generating systems (coal fired plant especially)
- Clean or low pollution electricity generation equipment or systems
- Supply of infrastructure equipment for grid expansion projects
- Technology that can reduce or shift the demand level during peak times

Equipment Sourcing & Purchasing

Larger projects, such as power station construction, are typically subject to a tendering process. Power companies often engage the services of an engineering, procurement and construction (EPC) contractor to undertake this role. Supply to these contracts is competitive, assumes knowledge of local technical requirements and may require several levels of qualification.

US companies that want to enter the Australian market should identify themselves to Australia's EPC contractors to ensure they receive timely information about tenders. Traditionally these EPC companies have maintained pre-qualified lists of equipment suppliers that meet local requirements.

Aside from notification by the EPC, most of the power companies advertise tenders on the websites.

Table 5 - Generation Projects in Australia

Generator type / fuel	Number of projects	Total Generation (MW)
Biomass + Coal Seam Gas	3	87
Black Coal	13	5,450
Brown Coal	2	326
Gas turbine	40	12,260
Hydro	1	130
Wind (total farms not turbines)	20	1,796

Industry sources from Australia's electricity generators and distributors reveal the procurement of standard items for usual operation and maintenance is mainly through established supplies. Companies maintain lists of suppliers of commonly used equipment. Most of the direct suppliers are local companies who often act as agents for overseas manufacturers.

Local suppliers that carry inventory to supply the electric power industry are therefore the most logical point of entry for standard supplies to the industry. Manufacturers of high value, low weight items may consider registering themselves directly with the power generating and distributing companies.

Companies that have new or innovative technology in the power sector might consider directly approaching the end users of this equipment. Often such equipment falls outside the usual construction and maintenance cycle and may require special consideration (e.g. trial retrofitting).

Market Access Issues & Obstacles

- There are no quota limits on the import of electrical power equipment into Australia
- All tariffs on the equipment discussed in this report have been reduced to 0% for US exporters following the introduction of the U.S. / Australia FTA on 1 January 2005
- Australia has a goods and services tax of 10% on all equipment inclusive of landed costs.
- US exporters should be aware that Australia uses the International Electrotechnical Committee (IEC) standard rather than that of the American National Standards Institute (ANSI). To be successful in the Australian market, U.S. suppliers need to comply with IEC standards.
- Aside from the IEC standards there are a range of Australian Standards governing the specific technical requirements, installation and operation of particular items of equipment - www.standards.org.au
- Australia has quite stringent occupational health and safety requirements for its heavy industries.

Market Entry

The electric power equipment market in Australia is a relatively mature market with a number of established local manufacturers. As indicated earlier, the US is already a substantial supplier of electric power equipment and technology to Australia along with a number of other countries. Because the market is highly competitive, we advise U.S. businesses to research and evaluate the Australian market carefully to identify the more attractive areas of opportunity. Innovative and technology-driven products provide the best opportunities to US manufacturers.

With the relatively small size of the Australian market and high skill base within the local industry, many US companies seeking to export to Australia establish a local partner (i.e. distributor, sales & service agent). Local firms already supplying equipment to the power industry are often looking for new products to extend their range, and generally have good contact with most of the generation companies and EPCs.

The U.S. Commercial Service is able to provide US companies with specific market intelligence relevant to their needs and to conduct partner searches to locate an Australian distributor or agent.

Resources & Contacts

- Australian Government Department of Industry, Tourism and Resources – www.industry.gov.au
- Australia Institute of Energy – www.aie.org.au
- Business Council for Sustainable Energy – www.bcse.org.au
- Energy Supply Association of Australia- www.esaa.com.au
- Office of the Renewable Energy Regulator - www.orer.gov.au

For More Information

The U.S. Commercial Service in Melbourne, Australia can be contacted via e-mail at: John.McCaffrey@mail.doc.gov; Phone: +61 3 9526 5924; Fax: +61 3 9510 4660; or visit our website: www.buyusa.gov/australia

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